Nutrient Use and Requirements of Carrots Grown for Seed

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Plant nutrition is balancing nutrient supply with plant demand. To satisfy plant demand, supplementation of soil nutrient supply is necessary for carrot root and seed production. The primary nutrient applied for both root and seed production is nitrogen with relatively routine phosphorus and potassium application for root production. At harvest, the aboveground biomass for an Oregon seed carrot crop contains between 200 to 250 kg N/ha with 20 kg/ha of this amount in the seed. French production of Nantes-type carrots for seed are reported to contain less N in aboveground biomass, 170 kg/ha. In contrast, a carrot root yield of 60 to 80 Mg/ha contains 225 to 350 kg N/ha. Even though the N concentration is similar in roots and tops, 1.5 to 2 mg/kg, the N content in roots is about three times greater compared to tops due to much greater root mass. Potassium content of seed carrot crops is approximately the same as the N content. The K content of root carrot crops can be as much as double the N content. P content of both types of carrot crops is about 10% of the N content. Seed carrots in Oregon accumulate N rapidly during May and June. All N is in the plant by early August or 5 to 6 weeks before harvest. The peak N uptake rate of 2.5 to 3.5 kg/ha occurs in late June. Time of N application recommended in France and Oregon are similar with the first application as the crop begins to grow in the spring. Additional N should be added before flowering. Maximum P uptake occurs about the same time as N. Potassium uptake slightly precedes N accumulation. In spite of accumulating more than 200 kg N/ha in a seed carrot crop, N rate for seed production is maximized at rates below 100 kg/ha. A primary factor is rotation. In central Oregon, carrot seed is commonly planted after bluegrass seed production. Cool season grass roots contain 75 to 100 kg N/ha that mineralizes as roots and crowns decompose. The longevity of a seed carrot crop allows efficient utilization of soil supplied N. Excess N is detrimental to carrot seed yield. Seed yield decreased almost 30% as N application rate increased from 55 to 100 kg N/ha in an Oregon trial with commercially grown Nantes type hybrid seed carrots. Additionally, seed size from the primary umbel also decreased with the same N rate increase. Soil N supply for carrot seed production is critical as little supplemental N is required in many rotations and excess N reduces seed yield. Application of 50 to 75 kg N/ha is usually adequate for carrot seed production in central Oregon.